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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte OLIVIER THER, ALFAZAZI DOURFAYE, BRUNO CUILLIER, WILLIAMS GOMEZ, YVES CAZALAS, and GILLES GALLEGO

Appeal 2019-006105
Application 15/352,763
Technology Center 1700

Before ROMULO H. DELMENDO, JEFFREY B. ROBERTSON, and JULIA HEANEY, *Administrative Patent Judges*.

DELMENDO, *Administrative Patent Judge*.

DECISION ON APPEAL

The Appellant[1] appeals under 35 U.S.C. § 134(a) from the Primary Examiner's final decision to reject claims 1 and 3–15.[2] We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42—i.e., "Varel Europe S.A.S." (Application Data Sheet filed November 16, 2016 at 7), which is also identified as the real party in interest (Appeal Brief filed April 2, 2019 ("Appeal Br.") at 3).

[2] *See* Appeal Br. 7–9; Final Office Action entered February 11, 2019 ("Final Act.") at 3–8; Examiner's Answer entered June 13, 2019 ("Ans.") at 4–11.

I. BACKGROUND

The subject matter on appeal relates to a method for manufacturing a matrix drill bit and to the manufactured matrix drill bit (Specification filed November 16, 2016 ("Spec.") ¶ 8; Abstract). Representative claim 1 is reproduced from the Claims Appendix to the Appeal Brief, as follows:

> 1. A method for manufacturing a matrix drill bit, comprising:
> placing a metallic blank within a casting assembly comprising a mold having an inner surface formed into a negative shape of facial features of the drill bit;
> loading powder into an annulus formed between the blank and the mold, the powder comprising at least one of: ceramic powder and cermet powder;
> placing a binder alloy into the casting assembly over the blank and the mold;
> protecting the binder alloy from oxidation;
> inserting the casting assembly, blank, powder, and binder alloy into a furnace;
> *operating the furnace to heat the protected binder alloy to an infiltration temperature between solidus and liquidus temperatures thereof and between 950°C and 1061°C, thereby infiltrating the powder with the binder alloy and forming a bit body*;
> removing the bit body from the furnace; and
> after removal, *attaching cutters to blades* of the bit body.

(Appeal Br. 10 (emphases added)).

II. REJECTION ON APPEAL

Claims 1 and 3–15 stand rejected under 35 U.S.C. § 103 as unpatentable over Thomas et al.[3] ("Thomas").[4]

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[3] US 2012/0298323 A1, published November 29, 2012.

[4] Although not included in the statement of the rejection, the Examiner refers to Horton et al. ("Horton"; US 5,000,273, issued March 19, 1991) as

III. DISCUSSION

Unless separately argued within the meaning of 37 C.F.R. § 41.37(c)(1)(iv), the rejected claims stand or fall with claim 1, which we select as representative pursuant to the rule.

The Examiner finds that Thomas describes a method for manufacturing a matrix drill bit in which the steps include most of the limitations recited in claim 1 (Ans. 4–5; Final Act. 3–4). Regarding the limitations "infiltration temperature between solidus and liquidus temperatures thereof and between 950°C and 1061°C" recited in the "operating the furnace" step of claim 1, the Examiner finds that Thomas discloses "operating the furnace to heat the protected binder alloy (160) to a desired infiltration temperature, thereby infiltrating the matrix powder (132) with the binder alloy (160) to form a matrix drill bit body (50)" (Ans. 5; Final Act. 3–4) (citing Thomas ¶¶ 100, 102, 111; Figs. 1–14). The Examiner states:

> *Although not explicitly disclosed by Thomas et al., one of ordinary skill in the art would have recognized that control of the infiltration temperature of the binder alloy between solidus and liquidus temperatures would depend upon the melting point and other properties of the specified metal alloys for use as the binder alloy, and also when taken in combination with the properties of the matrix powder to be used with the specified binder alloy*. In this instance, Thomas et al. disclose that the melting points of selected binder alloys vary within a range from about 815°C to about 1230°C, and such selected temperature ranges of infiltration to impart a more uniform solidification of the matrix drill bit body would be selected for improved quality control (see Thomas et al[.]; paragraph [0100]). In addition,

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further evidence for the infiltration temperature range (Ans. 5–6, 10; Final Act. 4, 7).

> Thomas et al. disclose that the infiltration temperature falls between the range of 1000°C and 1050°C . . . .

(Ans. 5–6; Final Act. 4 (emphasis added)).

The Appellant's principal contention is that "Thomas does not teach, suggest, or disclose operating the furnace to heat the protected binder alloy to an infiltration temperature between solidus and liquidus temperatures thereof and between 950°C and 1061°C, as recited in claim 1" (Appeal Br. 7). According to the Appellant, "Thomas discloses an infiltration temperature of 1150°C during the discussion of Working Examples at paragraph [0111] and claims a range of infiltration temperatures of 1100°C-1230°C at claim 17" (*id.*). In the Appellant's view, the first sentence of the reproduced Examiner's statement highlighted above "is unsupported conjecture" (*id.* at 8). The Appellant argues that "Thomas discloses almost nothing about the furnace temperature except that the binder melts when the furnace temperature reaches the melting point thereof" (*id.* (citing Thomas ¶ 100)).

Regarding Horton, the Appellant argues that this reference "teaches away from attaching cutters after infiltration, as recited in claim 1, and brazing the cutters, as recited in claim 8, at col. 2, lines 13-24" (Appeal Br. 8 (citing Horton col. 5, ll. 17–24)). According to the Appellant, "Horton unmistakably teaches away from the infiltration temperatures discussed/claimed by Thomas as leading to the destruction of the diamond cutters at col. 5, lines 17-24" (*id.* at 9).

We have fully considered the Appellant's arguments but find them unpersuasive to identify reversible error in the Examiner's rejection. *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011).

Thomas describes a method for manufacturing a matrix drill bit body **50** (Thomas ¶ 102; Fig. 14) comprising, *inter alia*, loading a metal blank **36** into a mold assembly **100** to produce a mold base **102** with a cavity **104** having a negative profile with respect to the exterior features of the resulting fixed cutter drill bit (*id.* ¶¶ 52, 92; Figs. 1, 3–9A, 10–13); loading a matrix powder **132**, which may be selected from ceramic materials, into the mold assembly **100** such that it fills the space between the metal blank **36** and the mold cavity **104** (*id.* ¶¶ 79–81, 93; Figs. 1, 3–9A, 10–13); placing a binder material **160**, which may be covered with a flux in the same manner as disclosed in the current Specification for protection of the binder from oxidation (Spec. ¶ 23), on top of a filter material **133,** a core **150**, and the metal blank **36** (*id.* ¶ 94; Fig. 4); placing the mold assembly **100** and materials disposed therein into a furnace after a preheating step such that "[w]hen the furnace temperature reaches the melting point of [the] binder material **160**, [the] molten binder material [**160**] may infiltrate [the] matrix powder **132**" (*id.* ¶ 100); removing the mold assembly **100** from the furnace and cooling the mold assembly at a controlled rate (*id.*); breaking away the mold assembly **100** to expose the composite matrix drill bit body **50** (*id.* ¶ 102); and providing the drill bit body **50** with at least one cutting element **60** in respective pockets **58** (e.g., cutting teeth disposed in the cutter pockets by brazing) for engaging, e.g., a subterranean formation (*id.* ¶¶ 54, 102–103).

Regarding the melting temperature of the binder material **160**, Thomas states that "[t]he melting point of the binder [material **160**] may vary depending on the binder material composition, and may generally be in the range of from about 590° C. (1100° F.) to about 1230° C. (2250° F.),"

with a preferred range being about 815°C to about 1230°C (*id.* ¶ 100). Thus, although Thomas discusses the infiltration conditions in terms of heating the furnace to a furnace temperature approaching the melting point of the selected binder material **160**, we discern no reversible error in the Examiner's determination (Ans. 5, 8–9; Final Act. 4) that the infiltration temperatures specified in claim 1 would have been obvious to a person having ordinary skill in the art in view of the disclosure regarding furnace temperature and the melting point of the binder material **160**. In this regard, it would reasonably appear that the conditions in Thomas would include actual infiltration temperatures that overlap significantly with the infiltration temperature of 950°C to 1061°C, as specified in claim 1, as the Examiner finds (Ans. 9–10). That overlap creates a prima facie case of obviousness, which shifts the burden of production to the Appellant to rebut it—either by persuasive argument or with objective evidence. *In re Peterson*, 315 F.3d 1325, 1329–30 (Fed. Cir. 2003).

The Appellant's reliance on Thomas's working examples (Thomas ¶ 111) disclosing an infiltration temperature of 1150°C and dependent claim 17 reciting a range of infiltration temperatures of 1100–1230°C is misplaced because Thomas is not limited to its working examples or preferred embodiments in a dependent claim but instead, as we found above, discloses broader ranges (*id.* ¶ 100). *Merck & Co., Inc. v. Biocraft Labs., Inc.*, 874 F.2d 804, 807 (Fed. Cir. 1989) ("[I]n a section 103 inquiry, 'the fact that a specific [embodiment] is taught to be preferred is not controlling, since all disclosures of the prior art, including unpreferred embodiments, must be considered.'") (citing *In re Lamberti*, 545 F.2d 747, 750 (CCPA 1976)).

As indicated above, the Appellant argues that the Examiner's position is based on "unsupported conjecture" (Appeal Br. 7–8). We disagree, because the disclosure in Thomas fully supports the Examiner's position (Thomas ¶ 100). Indeed, the Appellant appears to acknowledge that heating the furnace to a particular temperature or heating at least a part of the binder material to its melting temperature is, in effect, the same as the infiltration temperature in arguing that Thomas teaches a different infiltration temperature in the working examples (*id.* ¶ 111) and dependent claim 17 (Appeal Br. 7). The broader range of temperatures disclosed in paragraph 100 of Thomas overlaps significantly with the range recited in claim 1 currently on appeal.

The Appellant argues:

> Paragraph [0100] of Thomas discloses almost nothing about the furnace temperature except that the binder melts when the furnace temperature reaches the melting point thereof. The sentence of paragraph [0100] relating to proper infiltration and solidification of the binder material just informs about the sensitivity of locations adjacent to nozzle outlets and pockets. There is no actual teaching in this sentence related to the furnace temperature to ensure proper infiltration adjacent to the nozzle outlets and pockets. The sentence of paragraph [0100] relating to improved quality control allowing thinner blades also does not provide any teaching related to the furnace temperature. The rest of paragraph [0100] relates to controlled cooling of the mold assembly using insulation.

(Appeal Br. 8).

The Appellant's argument is unpersuasive. Thomas explicitly states that "[w]hen the furnace temperature reaches the melting point of [the] binder material **160**, [the] molten binder material [**160**] may infiltrate [the] matrix powder **132**" (*id.* ¶ 100). This explicit teaching in Thomas would

have indicated to a person having ordinary skill in the art that the melting point of the selected binder material controls the furnace temperature, and thus the infiltration temperature.

As for the Appellant's argument that Horton teaches away from the cutter limitations recited in claims 1 and 8 (Appeal Br. 8–9), the Examiner explains that the rejection relies on Thomas, which teaches the limitations at issue, as we found above (Thomas ¶¶ 54, 102–103).

For these reasons, we uphold the Examiner's rejection.

IV. CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 3–15	103	Thomas	1, 3–15	

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED